Ph.D

SYNOPSIS

TOPIC

"STUDY OF EFFECT OF LESENTA INSECTICIDE ON PHYSIOLOGY OF COMMON CARP *Cyprinus carpio* FROM DISTRICT ADILABAD (T.S)"

RESEARCH SCHOLAR

Mummadi Narsing Rao

RESEARCH GUIDE

(Dr. R.P.Mali)
Professor and Head
PG & Research, Dept. of Zoology
Yeshwant Mahavidyalaya
Nanded.

SYNOPSIS

STUDY OF EFFECT OF LESENTA INSECTICIDE ON PHYSIOLOGY OF COMMON CARP *Cyprinus carpio* FROM DISTRICT ADILABAD (T.S).

INTRODUCTION :-

Since very ancient time, it was the tradition of man to interfere with various natural environmental situations . The remarkable progress of todays world facing many global environmental problems to date. The heavy modernization of the world with vast industrialization, using excess amount of fertilizers and pesticides in the agriculture sectors, causes terrible ecological crisis for man. Among different environmental situations, aquatic environment is serious sufferer of the damage caused by input of anthropogenic pollutants.

In recent years the development of agriculture sector is one of spectacular situation found in India. But due to selfishness of man, the excess use of Fertilizers , Insecticides,Pesticides , Herbicides, Fungicides & Rhodenticides may responsible for aquatic contamination including freshwater ponds, dams, rivers and streams of various regions of the country. When such a pollutants release into any type of water bodies, they pollute the aquatic biota including crustaceans, molluscans and vertebrates like amphibians, reptiles and fishes.

Use of Insecticides and pesticides is common activity of farmers in India. But the farmers are not using the insecticides and pesticides as per the company recommended doses to the crop. They are using unwanted excess doses of insecticides, pesticides which puts our life in danger.**(1)**

The District Adilabad of Telangana State is famous for Cotton , Soa and Red Gram Crops. To avoid the attack of pests on these crops, the farmers are using various types of Pesticides and insecticides such as Malathion, Pentathion, Carbamate and Lesenta . The excess use of such a pesticides causes damage to aquatic biota . Some work has been done on effect of pesticides on physiology of freshwater fish. But very little attention has been paid on effect of Lesenta insecticide on aquatic organism like fish. This is effective and prevent the crop from different pests. The Lesenta is a broad use insecticide. The components of Lesenta insecticide are imidaclopride(40%) and Fipronil(40%) which belong to neonicotinoid and phenylpyrazole chemicals families respectively. Imidaclopride and Fipronil are components of Lesenta work against sucking insect pests **(2)** . The mode of action of this neurotoxic insecticides like imidaclopride is similar to that of nicotine and competes with acetylcholine for

receptor site **(3)**. It is binding over stimulates the acetylcholine (Ach) receptors on the postsynaptic membranes of neurons **(4-6)**. The mode of action of the compound Fipronil of Lesenta insecticide is disrupts the insect's Central Nervous System(CNS) by blocking GABA Gated Chloride channels and glutamate gated chloride(GluCl) channels resulting in CNS toxicity. This causes hyper-excitation of contaminated insects nerves, muscles **(7)**. After spray on fields the Lesenta (Systemic Insecticide) moves easily between plant tissues and also from roots to soil and water in the fields **(8)**. In this way this insecticide is gradually released into the aquatic ecosystem where it is stable to hydrolysis **(9)**.

Hence present study have been undertaken with effect of Lesenta a systemic insecticide which is the mixed chemical component of imidaclopride and fipronil on fresh water fish *Cyprinus carpio*. The fresh water fish *Cyprinus carpio* is selected as an indicator fish to study the impact of toxicity evaluation. This fish has selected because it is easily available in the area of Adilabad, highly sensitive and edible fish of this region. The fish shows highest growth rate than other fresh water fishes. It is broadly cultivated in seasonal ponds of Telangana State. **(10)**

OBJECTIVES OF THE RESEARCH :

1. To study the test indicator fish *Cyprinus carpio* with its detailed charactors and classification .
2. The study of toxicity evaluation (determination of LC_{50}) of Lesenta insecticide on *Cyprinus carpio*. **(11)**
3. Study of respiratory metabolism with total Oxygen consumption and rate of Oxygen consumption under the influence of Lesenta insecticide and compared the control set. **(12)**
4. To study effect of insecticids on haematology including RBC, WBC ,ESR & HB along with control set . **(13-14)**
5. The study of activity of Melanaldehyde (MDA) and Antioxidant enzymes such as catalase, SOD (Super Oxide Dismutase) in serum and tissues (Liver, Kidney, Brain and Mucles). **(15,22)**
6. Study of biochemical alterations on proteins, glycogen , glucose, amino acids and lipids of muscle, liver, kidney & brain under influence of Lesenta insecticide **(16-20)**

METHODOLOGY TO BE ADOPTED

The experiments would be performed at different exposure times and their effects are evaluated in the following different physiological and biochemical parameters of the fish by using different standard methods & techniques.

(1) Toxicity Evoluation :-

Healthy fresh water fish *Cyprinus carpio* will be collected from the local fish market and divide fishes into different sets and kept in aquariums. To avoid any dermal infection 1% $KMnO_4$ solution will be added

Toxicity Evaluation will be carried out by the fenny method (1971). **(11)**

(2) Respiratory Metabolism :-

The respiration metabolism will be studied by Winkler's method & by saroja

(1959). (12)

(3) Haematological Alterations :-

To asses toxic effects on haematological parameters such as (a) RBC, WBC count by using Neuberger haemocytometer . (b) Estimation of Hb will be carried out by Sahli's method. (c) ESR estimation will be carried out by Wintrobe method (1973). **(21)**

(4) Determination of Melanaldehyde(MDA) :-

To determine MDA in serum and tissues of fish will be done by using M.Swamy et al (2010) method. **(22)**

(5) Antioxident Enzymes Activity :-

(a) Determination of Catalase activity will be carried out by L.Goth (1991) method. **(23)**

(b) Super Oxide Dismutase (SOD) activity in the serum and tissue will be carried out by P.Dogan (1994) method. **(24)**

(6) Biochemical Alterations :-

(a) Protein estimation will be carried out by the method of Lowry et al (1951). After the exposure of 24,48,72,96 hrs the protein estimation will be studied.

The Protein will be expressed in terms of mg of protein/gm. wet weight of tissue. **(25)**

(b) Glucose and Glycogen estimation will be carried out by method of Caroll et al (1956).(26) After the exposure of 24,48,72,96 hrs the glucose and glycogen estimation will be studied. The values of Glucose and Glycogen content will be expressed in terms of mg of Glycogen / gm. wet weight of tissue.

(c) Amino Acids estimation will be carried out by the Fielder et al (1971) method.(27) After the exposure of 24,48,72,96 hr amino acid estimation will be studied . The values of amino acid will be expressed in terms of mg of amino acid/gm wet weight of tissue.

(d) Lipids will be extracted and estimated from tisues by using the Bligh and Dyer (1959) method. After the exposure of 24,48,72,96 hrs the Lipds will be estimated.(28)

IMPORTANCE OF STUDY / SOCIETY APPLICATIONS :-

(1) By using scientific knowledge of current research the farmers will be learnt with appropriate information of insecticide use.

(2) The awareness among the farmers will be increased regarding the use of natural insecticides rather than use of serious toxic insecticides .

(3) The People will aware of using the fish population effected by insecticides to avoid health hazards among them.

PROPOSED WORK PLAN /FORMULATION & STRUCTURE OF STUDY :

YEAR WISE PLAN OF RESEARCH WORK :

First Year :- (1)Review of Literature , collection of references from various sources and study of fresh water fish *Cyprinus carpio*

(2) Study of toxicity evaluation i.e. determination of LC_{50} value under influence of Lesenta insecticide compared with control .

Second Year :- (1) Study of respiratory metabolism includes total respiration & rate of respiration under influence of Lesenta insecticide compared with control.

(2) Study of Haematological parameters includes RBC & WBC count , Hb & ESR estimation.

(3) Determination of melanaldehyde (MDA) and antioxidant enzymes such as catalase , SOD.

Third Year :- (1) The study of biochemical parameters includes alterations of Proteins , Glucose , Glycogen , Amino Acids and Lipids in different tissues of *Cyprinus carpio*.

(2) Analysis of statistical data, documentation and presentation of data, calculations, results, discussions, conclusion and summary. Preparation of synopsis and DTP work of thesis.

REFERENCES :-

1. Rao JV, Begum GV, Reddy NC (2005): Sub-lethal effects of Monocrotophos on Locomotor Behavior and Gill Architecture of the Mosquito Fish, *Gambusia affinis*. Journal of Environmental Science and Health, Part B, 2005 :3:813-825.
2. Cox C. Imidacloprid. Journal of Pesticide Reform. 2001;21 :4-5.
3. Matsudak K. et al (2001): Neonicotinoid insecticides acting on insect nicotinic acetylcholine receptors. Trends in Pharmacological Sciences. 2001;22:573-580
4. Kidd H, James DR (1991); The Agrochemicals Handbook, 3rd ed. The Royal Society of Chemistry, Unwin brothers Limited, Old Working , Surrey, UK,1991.
5. Tomlin CDS. The pesticide manual (1997) : Incorporating the agrochemicals handbook, 10th ed. British Crop Protection Council, Farnham, Surrey, UK, 1997.
6. Song MY, Stark JD, Brown JJ (1997): Comparative toxicity of four insecticides, including imidacloprid and tebufenozide, to four aquatic arthropods. Environmental Toxicology and Cheistry. 1997; 16:2494-2500.
7. Chemical history of Fipronil from internet.
8. Felsot AS, Cone W, YuJ, Ruppert JR (1998); Distribution of imidacloprid in soil following subsurface drip chemigation. Bulletin of Environmental Contamination and Toxicology. 1998:60:363-370.
9. Nemeth-Konda L, Fuleky Gm Morovjan GY, Csokan P (2002); Sorption behavior of acetochlor, atrazine, carbendazim, diazinon, imidacloprid and isoproturon on Hungarian agricultural soil. Chemosphere. 2002;48:545-552.
10. Dr. Ravishankar Pisca, Sri P.Haribabu et al – Matsya saastram – 1998.
11. Fenny et al 1971- Discribed about methods for toxicity evaluation .

12. Welsh and Smitgh (1959) and Saroja (1959)-The estimation of dissolved oxygen in blood and water. In Laboratory exercises in Invertebrate physiology, Burgess, Minneapolis, PP184-8.

13. Chandra S. Ram R.N, Singh I.J(2001)-Toxic effect of carbofuran on certain hamatological parameters in fingerlings of *Cyprinus carpio* .

14. Yonar ME, Yonar SmM, Ural MS, Silici S, Dusukcan M, Protective role of propolis in chlorpyrifosinduced changes in the haematological parameters and the oxidative/antioxidative status of *Cyprinus carpio* , Food and Chemical Toxicology, 50, 2703-2708.

15. Kavitha P, Rao J, Toxic effects of chlorpyrifos on antioxidant enzymes and target enzyme acetylcholinesterase interaction in mosquito fish, *Gambusia affinis*, Environmental Toxicology and Pharmacology, 26,2008,192-198.

16. Tilak KS, Veeraiah K, Rao DK(2005): Biochemical changes induced by chlorpyrifos, an organophosphate compound in sublethal concentrations to the freshwater fish *Catla catla, Labeo rohita* and *Cirrhinus mrigala*, Journal of Environmental Biology, 26 , 2005, 341-347.

17. Reddy NM, Ghousia B, Rajender K, Rao JV (2011): Toxic impact of tow organophosphate insecticides on biochemical parameters of a food fish and assessment of recovery response, Toxicology and industrial Health, 2011,1-10.

18. Padmini K, Rajaram P (2016): Effect of chlorpyrifos on some biochemical constituents in liver and kidney of freshwater fish , *Channa gachua* (F.Hamilton), International Journal of Science and Research (IJSR), 5(4),2016,1975-1979.

19. Srinivasa Rao P, Bujji Babu N, Ramesh Raju R (2010): Study on the effect of chlorpyrifos on proteins in freshwater fish *Labeo rohita* by using HPLC method , international journal of research in pharmaceutical and Biomedical Sciences, 1(1), 2010,1-5.

20. Kumble GB, Muley DV (2009): Effect of acute exposure of endosulfan and chloropyrifos on the biochemical composition of freshwater fish *Sarotherodon mosambicus*, Indian joural of Environmental science,4,2000,97-102.

21. Blaxhall & K.W. Daisley (1973):- Routine haematological methods for use with fish blood- Journal of fish Biology,5:1973,771-781

22. M.Swamy et al (2010): Estimation of Thiobarbituric Acid Reactive Substances (TBARS) in different regions of brain in epilepsy rat model. Jphysiol Biochem (2011) 67:105:113.

23. L.Goth(1991):"A simple method of determination of serum catalase activity and revision of reference range'', *Clinica chimica acta,* Vol.196 , no.2-3, PP.143-151.

24. P.Dogan et al (1994): " Oxidative enzymes of polymorphonuclear leucocytes and plasma fibrinogen, ceruloplasmin & copper levels in Behcet's disease'',clinical biochemistry , vol.27,no.5, PP.413-418,1994

25. Lowry et al (1951):The original method for protein estimation. J. Biol. Chem 193:265

26. Caroll N.Y et al (1956)-Glycogen determination in liver and muscles by use of Anthrone reagent .J. Biochem 1956, 220, 583-593.

27. Fielder et al (1971)-Napthoquino-4 Sulphuricacid method , Comp .Biochem. Physiol.39BPP.291.

28. Bligh and Dyer(1959): A rapid method of total lipid extraction and purification. Can J Biochem physiol 1959, 37:911-977

RESEARCH SCHOLAR

Mummadi Narsing Rao

RESEARCH GUIDE

(Dr. R.P.Mali)
Professor and Head
PG & Research, Dept. of Zoology
Yeshwant Mahavidyalaya
Nanded.